PRELIMINARY NOTE ON A NEW PROTOZOAN PARASITE OF EARTHWORMS OF THE GENUS *EUTYPHŒUS*.

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In the course of a recent study of the earthworms of Burma a large protozoan parasite of unusual form was frequently encountered. The writer can discover no reference to any parasitic animal of similar form in the literature. The following description will therefore be of interest to zoölogists, although it should be understood that the present paper attempts nothing more than the presentation in a preliminary way of data gathered during a study of the host animal.

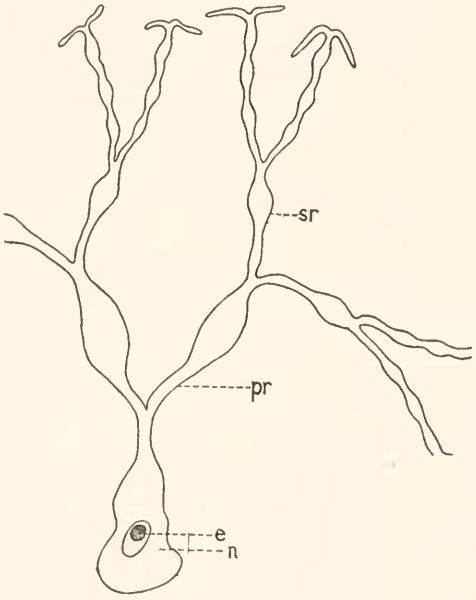

FIG. 1. Part of a trophozoite. (Camera lucida.) *s.r.*, secondary ramus; *p.r.*, primary ramus; *n.*, nuclear membrane; *e.*, endosome.

The parasites may be as long as 4 mm. To the unaided eye

the animal presents a smooth creamy-white appearance, or very rarely, a light brownish tinge. The latter color, however, is probably due to a staining action on the parasite of some substance from the host. The large unattached end of the animal is bluntly rounded. At a greater or less distance from this end the body branches into two rami each of which is narrower than the main trunk (Fig. 1). Each of the two primary rami branch again to form two smaller secondary rami. This branching continues until eight or sixteen small ramuli are produced. The region at which ramification begins is not constant in position.

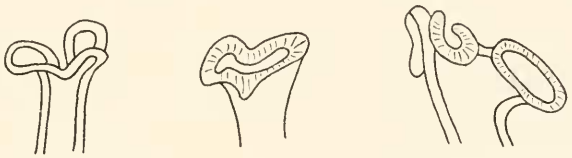

FIG. 2. Sucker-like organs of attachment. (Camera lucida.) × ca. 475.

In one specimen which is 1.4 mm. long the first branching occurs at a distance of about .9 mm. from the blunt end, the second 1.2 mm., and the third 1.32 mm. In other specimens the trunk portion is often much shorter proportionately, rarely even shorter than the primary rami. The ramuli at the attached end are the shortest, the rami usually increasing in length towards the free end of the parasite. The dichotomy is regular in all specimens examined. The ramuli bear groups of irregularly-ovoid, sucker-like objects by means of which the parasite is attached to the host (Fig. 2).

Longitudinal and transverse striations are visible in the ectoplasm with the high powers of the microscope. The transparent fluid endoplasm of the trunk and primary rami is densely packed with ovoid paraglycogen granules. These granules are widely separated in the secondary rami and only very sparsely distributed in the ultimate, transparent branches.

The nucleus (Fig. 3) is a large, ovoid body sometimes visible to the unaided eye in cleared specimens as a minute spot. In large specimens it is .64–.86 mm. in length. The contents of the nucleus are perfectly transparent except for a single, eccentrically located, spherical body of light bluish appearance.

This endosome has either one large, or several smaller, transparent, vacuole-like areas. The nuclei of dead parasites are always found in the unbranched portion.

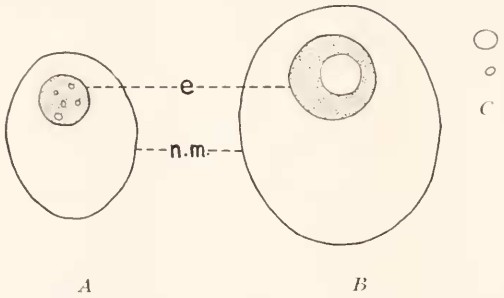

FIG. 3. *A*. Nucleus from trophozoite 1.3 mm. in length. (Camera lucida.) × ca. 335. *e.*, endosome; *n.m.*, nuclear membrane. *B*. Nucleus from larger trophozoite. (Camera lucida.) × ca. 350. *C*. Paraglycogen granules. (Camera lucida.) × ca. 350.

Live attached parasites have not been studied but in living detached forms two series of movements are noticeable. The first series may be described as waves of peristaltic contraction passing along the trunk and rami of the first order. These peristaltic contractions produce a back and forth churning of the endoplasmic contents in the trunk, from the trunk into the primary rami, and back and forth in the rami. By these contractions the nucleus is squeezed to and fro from one end of the trunk to the other. In two of the living specimens examined the nucleus remained in the unbranched portion of the parasite during the whole period of observation. In the other animal the nucleus frequently passed into one or the other of the primary rami. In the primary ramus the nucleus was either rolled back and forth several times or at once passed back into the trunk. The nucleus moved with equal ease and frequency into either one of the primary rami but never passed into the secondary rami which were narrower than the nucleus. It should be noted that in this third animal the ramification began unusually near the blunt end so that the trunk portion was less than one third of the total length of the parasite.

The second series of movements may be called rotation movements and result in a spiral twisting of the primary rami and their branches back and forth on their own axes.

The parasites occur in the cœlomic cavities of one genus of Burmese earthworms, *Eutyphœus* and most commonly in *E. foveatus*. They are found in smaller numbers and more rarely in *E. spinulosus*, *rarus*, and *peguanus*. One hundred per cent. of the *E. foveatus* examined during a period extending over four years have been infected. In the majority of worms of the last named species, large numbers of parasites are found, masses containing 20–40 individuals being not uncommon. The largest groups of parasites occur in segment three, the majority of which are attached to the large nephridial masses of this segment. Other locations are: under the nerve cord in segment four, and on the septa or parietes of segments four to twenty. Those found posterior to segment nine are almost always less than one millimeter in length.

Aikinetocystis singularis, n. gen., n. sp.

Diagnosis.

Uninucleated protozoa parasitic in the cœlomic cavity of certain earthworms of Burma; body cylindrical or columnar with a characteristic, regularly dichotomous branching at the attached end; fixation to the host by means of sucker-like bodies borne on the ultimate branches; nucleus with a single eccentrically placed endosome.

Additional Observations.

Pairs of animals are frequently found attached to each other near the rounded free ends. Among the larger sized forms such pairs are nearly as common as single animals, but do not occur among the smaller parasites. Groups of three to eight animals similarly adherent to each other are also found. Attempts to pull apart the attached animals have always resulted in breaking one or both of the animals near the place of attachment. However no evidence of organic connection between members of a pair or group has been found.

Monocystid-like spores of typical pseudo-navicella form in masses visible to the naked eye are sometimes present in segments three to five. In other specimens in which such masses are not visible similar spores can almost always be found by scraping the body wall of the segments just mentioned. The spores are of

two sizes: the larger .02–.023 mm. long, the smaller .007–.008 mm. long. The contents of the spores are coarsely granular. A single transparent vesicular body is present, centrally placed in the small spores, eccentrically placed in the large spores. As no other parasites with a cyst- or spore-forming habit are found in segments three to five and as the spores are practically always present with the trophozoites, it may be inferred, at least tentatively, that they are produced by the trophozoites with which they are always associated.

Numerous specimens of the host have been dissected in every month in which the worm can be obtained but only three cysts from as many worms have been found in proximity to the trophozoites. The cyst in each case was ovoid in shape and about .62 mm. long. A tough membrane enclosed a fluid in which floated two hemispherical bodies in contact with each other on a flattened surface, nearly filling the cavity of the cyst. After rupturing the membrane the gamonts were easily separated from each other. The single hemisphere retained its shape and opacity in clearing fluid. Rupturing the hemisphere by pressure on the cover-glass released granules similar in appearance to those found in the endoplasm of the trophozoite, but no nucleus or spores could be seen. Spore-containing sporocysts have not been found in the anterior segments but cysts about .75 mm. long and .6 mm. wide, densely packed with spores similar in size and appearance to those occurring in the anterior segments are sometimes present in the whitish masses filling the cœlomic cavities of the anal segments.

Worms of the genus *Eutyphœus* occurring in Rangoon suddenly disappear at the end of the rainy season and are not to be found again until after the beginning of the next rainy season. The failure to find the sporocysts in spite of the constant presence of the spores may be due to a coincidence of the sporocyst formation with this winter hibernation period of the host.

Summary.

A new protozoan parasite of the cœlomic cavities of certain tropical earthworms, with a remarkable branched structure of the trophozoite is described. Mention is made of associated spores and sporocysts possibly belonging to the trophozoites.